



The 2023 Wet Season Caribbean Regional Climate Outlook Forum (CariCOF) Kingston, Jamaica

May 24th and 25th

Final Report





1.0 Introduction

The Caribbean wet/hurricane season typically has implications for disaster risk management, with perennial threats from tropical cyclones (tropical depressions, storms and hurricanes), floods, landslides and increasingly, heat. It is now customary to have participation from National Disaster Management Organizations for this CariCOF. However, the 2023 wet/hurricane season CariCOF focused also on the water and health sectors. In collaboration with the European Union, the Organisation of the African, Caribbean and Pacific States (OAFCS), the National Oceanic and Atmospheric Administration of the USA, the Climate Risk and Early Warning Systems project, the World Meteorological Organization and the International Research Institute for Climate and Society of the Columbia University, the 2023 Wet/Hurricane Season CariCOF took place from 22nd to 25th May in Kingston, Jamaica. The Forum was held on the 24th and 25th featuring four sections:

1. The delivery of the forecasts for the season (which includes rainfall and temperature forecasts, as well as forecasts of drought and dry spells that limit water availability, wet days, wet spells, extremely wet days and extreme wet spells that provide insight into the potential for flooding), the Atlantic Hurricane Season activity, and heatwaves along with sub-seasonal forecasts up to 2 weeks,
2. Climate change and its implication for the three targeted sectors (water, health and disaster risk management) in the Caribbean,
3. Climate services for the water sector and water users in the Caribbean, with a focus on new research and development activities
4. Caribbean health concerns in a changing climate.

The following links give access to the [concept note](#). The forum agenda can be viewed in [Appendix I](#) and the attendee list in [Appendix II](#).

The Stakeholder meeting –May 24th

The 2023 Wet/Hurricane Season CariCOF meeting began with an official greeting to all participants by Mr Adrian Trotman, Chief of Applied Meteorology and Climatology and Head of the Caribbean Regional Climate Centre, (Caribbean RCC) and at The Caribbean Institute for Meteorology and Hydrology (CIMH). Mr Trotman introduced participants at the head table including the representative from the delegation of the European Union in Jamaica, regional agencies, national meteorological services and other national agencies, as well as online





participants (including the representative of the delegation of the European Union in Barbados and the Project Manager of the Climate Services and Related Applications (ClimSA) programme). He mentioned the first CariCOF was convened in May 1998 in Jamaica, in response to, arguably, the strongest El Niño (1997 – 1998) on record, when drought was experienced in many Caribbean countries.

Mrs. Jacqueline Spence-Hemmings, Head of the Climate Branch of the Jamaica Meteorological Services (JMS) brought greetings on behalf of the Director of JMS, Mr. Evan Thompson. Mrs Spence-Hemmings called for active participation in the development and communication of early warning information to assist with the response to climate variability and change. She emphasized that the time for talking has passed and that action is now required as death from storms and drought have increased and, we are faced with the problem of rising sea levels.

This was followed by a greeting from Mr. Aniceto Rodriguez Ruiz, Head of Cooperation for European Union Delegation, Jamaica. Mr Ruiz welcomed participants on behalf of his colleagues from the European Union in Barbados reminding that we are now approaching the 2023 hurricane season. Mr. Rodriguez emphasised the importance of support being given towards the development of the various climate products, along with the benefits of preparing such products for the health and water sectors, stressing on the importance of building resilience against climate change with the aim of reducing vulnerabilities.

2.0 Presentations

2.1 Wet/Hurricane Season Climatology of the Caribbean and Review of the 2022 Wet Season and recent conditions in the Caribbean by Mrs Shontelle Stoute, Technical Officer CIMH

Mrs Shontelle Stoute of the CIMH reviewed the 2022 Wet/Hurricane Season and recent conditions across the Caribbean, reporting on recent impacts from extreme weather and climate events such as floods and drought. Mrs. Stoute pointed out that in November 2022, the agriculture sector in parts of the region, including Cuba, was affected was affected by drought. In other countries, such as Guyana, the effects of flooding were felt, while Puerto Rico felt the impacts of Hurricane Fiona, whereby homes were destroyed while still recovering from the devastation caused by Hurricane Maria.

In terms of heat, some territories reported experiencing some hot months, with no end in sight to the excessive heat felt, while rainfall accumulations across the region were lower than normal and that most of the region was dry, and in some cases, exceptionally dry.





2.2 El Nino Update and Wet/Hurricane Season Climate Outlook (rainfall, temperature, wet days/wet spells, drought, dry spells, heatwaves, coral bleaching outlook, flash flood potential) by Theodore Allen, CIMH

Dr Teddy Allen of the CIMH reported on the factors driving different climate conditions during this year’s season, comparing the warmer than normal Atlantic and the Pacific regions. These result in opposing conditions in the Caribbean region – the warm Atlantic encouraging convection and rainfall, and the El Nino reduced convection and tropical cyclone activity. He went on to look at the atmospheric circulation patterns associated with the El Nino in the Pacific, stating that El Nino conditions involve weakened trade winds, eastward shifted centre of convection and descending air over the Caribbean, whereas in the case of the recent La Nina event, conditions were the complete opposite. He then stated that the forecast for the Pacific is warmer than normal with the El Nino expected to re- emerge. At the same time, the Atlantic is and will continue to be warmer than normal.

2.3 Seasonal Outlooks Jamaica, by Peter Fearon, Jamaica Meteorological Services

Mr Peter Fearon from the JMS began his presentation by addressing the question “How hot will the next 3 to 6 months be?” stating that the period will get hotter. This led to the Implications of heat stress for livestock and the most vulnerable population in the society, pointing out that there is the potential for high probabilities of at least 15 and 30 heatwave days during June-July-August, and potentially more to come through September and October. In terms of rainfall, he looked at the increasing flash flood potential associated with excessively wet days towards August, as well as any potential drought concerns in the Caribbean, stating that there is concern for drought in some areas, but for the greater part, no concern. Participants were encouraged to keep themselves updated with references to more climate hazard-specific information, for instance in the regional and national climate bulletins.

A question-and-answer segment followed whereby the main concerns were with regards to the higher temperatures and for children having to deal with the heat. It was suggested that great consideration be given to the time of day for routine outdoor activities, for example physical education,

2.4 An outlook on the 2023 Hurricane Season, by Dr Cedric Van Meerbeeck, Climatologist, CIMH

Dr Van Meerbeeck stated that the Atlantic Hurricane Season Outlook for 2023 was expected likely be close to normal. He stressed that this doesn’t imply that we should stop being vigilant, stating that there is still some chance for greater than usual activity even though El Nino is reducing the activity level. He went on to say that forecasts made after mid-May are better predictable, hence he encouraged everyone to look for upcoming updates as the confidence level rises, particularly in early August.



2.5 Preparing Caribbean Sectors for future Climate-related Challenges, by Dr Jayaka Campbell, Climate Studies Group Mona Campus

Dr Campbell presented on preparing Caribbean sectors for future climate related challenges. In his presentation he stated that it is important to set the context of the past, focusing on significant trends which highlight potential changes in the long run. He pointed out that from the 1900's up until now that there has been a slight downward trend in Caribbean precipitation with the number of rainfall days decreasing. What does this mean? When rain falls it makes up for when it does not, going from one extreme to the next. He also mentioned that we tend to plan our lives around the climate with interest in long term changes as opposed to what is happening tomorrow. He then pointed out that we live in a data challenged region and an adequate dataset is required for good climate analyses. In terms of temperatures, they are expected to increase with a statistically significant trend of 0.09 degrees centigrade per decade stressing that when we feel too hot it is too late, and the effects of the resulting impacts are felt. He concluded that these impacts can possibly result in stress, anxiety, depression and other mental health issues.

Participants then engaged in a game of Jeopardy segment that tested their retention and understanding of the information presented.

2.6 Question and answers / Future Climate

Based on the discussions about the implications of the seasonal forecasts and future Caribbean climates on sector productivity, four sector groups were formed. These were 1. health, 2. disaster risk management 3. water and 4. a mixed group. The questions asked to the groups were:

1. For Seasonal Forecasts:
 - a. What are the likely impacts from any of the forecasted extreme events of concern to your sector?
 - b. In response to the potential hazards, what would you do to mitigate likely negative impacts? Would any of these responses be different to what you would typically do?
2. For Multi-Decadal Projections:
 - a. Based on the projections, what would be the impacts of greatest concern to your sector?
 - b. What are some of the challenges in preparing for these major concerns?

The main points of discussion are captured below:

Health

What are the likely impacts from any of the forecasted extreme events of concern to your sector?



1. Heatwave-heat stress/heat stroke especially in vulnerable population effects from mild rash, cramps, dehydration to potentially life-threatening conditions e.g., heat stroke. Causes surge capacity and overwhelm health system.
2. Wet Spells/Flooding- increase pests, vector& water borne illnesses, lack of potable water, increase infection rates, interruption in essential services, damaged infrastructure.

In response to the potential hazards, what would you do to mitigate likely negative impacts? Would any of these responses be different to what you would typically do?

- Mitigation- policies, health education, capacity building, training, simulation exercises, social media (staff & public), engage younger and older population, increased surveillance.
- Difference- Geospatial system which is a data base from national level to all health regions with real time data and graphical representation.

Based on the projections, what would be the impacts of greatest concern to your sector?

- Population & Economic Displacement
- Food and Water Scarcity
- Morbidity and mortality

What are some of the challenges in preparing for these major concerns?

- Funding
- Lack of policies and SOPs
- Lack of Political will
- Education and Training
- Lack of human and material resources
- Decreased resilience of health system

Disaster Risk Reduction

What are the likely impacts from any of the forecasted extreme events of concern to your sector?

- Flash flood potential





- Drought & Heat Waves (High UV); consequential impacts on agriculture (livestock & poultry); impact on vulnerable persons; increased demand on healthcare systems; combinations of heat + other conditions (e.g., flu)
- Potential for hurricanes & storm surge

Challenge: getting the message out in time and having an impact

In response to the potential hazards, what would you do to mitigate likely negative impacts? Would any of these responses be different to what you would typically do?

- Preparedness activities underway, e.g., cleaning of drains, retrofitting bridges (A&B)
- Ensuring that flood pumps are working, having mobile pumps
- Area-specific forecasts for heat (Jamaica)
- Regional perspective: more attention needs to be given to an adequate response mechanism for heat events & water scarcity scenarios

Based on the projections, what would be the impacts of greatest concern to your sector?

- Drought and Heat: increasing occurrence of drought and water scarcity; higher incidence of heat events – impacts on outdoor activities, e.g., farming and consequential effects of loss of farmers on economies; changing work patterns, e.g., shift work to work in ‘cooler time’
- Increased frequency [and earlier time of formation] of intense hurricanes, with increased rainfall amounts (also mentioned the increased likelihood of unnamed severe weather systems)
- Sea level rise: high number of low-lying settlements; combination of storm surge & higher MSLs; impacts on ground water supplies
- Warmer nights: more rainfall during nighttime?

What are some of the challenges in preparing for these major concerns?

- Planning for increasing frequency of intense hurricanes, e.g., building resilience in housing stock for Cat. 5, heat
 - Green construction
- Being more proactive in planning instead of reactive
- Public education and outreach in an easily understood language
- Financing of these and other initiatives





Water

- **What are the likely impacts from any of the forecasted extreme events of concern to your sector?**
 - The two concerns highlighted for the early season are flooding and heat.
 1. Flooding
 - Damaged Infrastructure
 - Water table contamination
 - High sediment load and erosion
 - Drainage in east-west corridor for Trinidad affects agriculture and the economy
 - Heavy flooding affects aquifer recharge
 - Surface water treatment plants are affected by flooding
 2. Heat effects
 - High evaporation
 - Workers in the water sector become affected with prolonged heat exposure.
 - Heat waves also affect productivity
 - Effects on animals and plants become affect by heat stress
 - Higher temperatures/heat increase demands for water
 - Increase in maintenance for desalination plants as the engines are operating in hotter conditions
 - **In response to the potential hazards, what would you do to mitigate likely negative impacts? Would any of these responses be different to what you would typically do?**
 - Recommended Actions:
 1. Drainage maintenance including cleaning in advance of the wet season to lesson impacts of flooding.
 2. Investment in water harvesting technologies
 3. Develop early warning systems with colour codes and commensurate recommended actions
 4. Public awareness concerning proper use and misuse of water.
 5. Increase water storage including retention dams.
 6. Penalties for water wastage
 - **Based on the projections, what would be the impacts of greatest concern to your sector?**
 1. More intense but shorter periods of rainfall
 - This leads to flash flooding
 - Reduction in water availability with a reduction in wet and rainfall days.
 - Higher demands for water in the dry season
 - Increase in gastro-intestinal disease with water shortage and less hand washing.
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2. Increase in Temperature
 - Increase in heat waves
 - Increase in evapo-transpiration reduces water storage
 - Depletion of soil moisture loosens soil and increases flash flooding
 - Insufficient water affects activities/festivals including Carnival (Antigua and Barbuda)
- **What are some of the challenges in preparing for these major concerns?**
 1. Lack of integration of sectors and Ministries. There needs to be a shared vision and collaboration in mitigation and adaptation strategies.
 2. Lack of resources including financial
 3. Insufficient capacities with the requisite skills in some countries
 4. Lack of public awareness. This exacerbates the problem and increases risk to especially vulnerable communities and demographics.
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Mixed Group – remaining sectors present

- damage to infrastructure due to extreme weather events
- Significant impacts on agriculture in particular vegetable farmers and livestock
- Issues of flooding resulting in coastal communities being affected
- Concerns raised over the adequate provision of weather advisories
- Financial challenges a concern when it comes to preparations for extreme weather events
- Increased use of AC units a consideration in beating the heat
- Early warning advisories against heat exposure should be pursued
- Improved crop varieties to suit future climate

Major issues affecting the tourism sector:

Tropical Cyclones:

- The low season coincides with the hurricane season and so hotels are generally not at full capacity. Rates are significantly lower at this time so the business's income is also lower.
- Hotels are obliged to have plans in place for the season and are required to spend money on hurricane supplies, food, non-perishables, first aid, water etc.
- Accommodations encourage the visitors to purchase additional supplies in the event of a cyclone to help spread the costs.





- Cyclones bring the added risks of sea surges, saltwater intrusion, damage to property, etc

Heat Stress

- This is an issue for guests and staff. We have an increasingly aging tourist and staff population
- The heat season coincides with the low season and income is lower. However, accommodations see an increase in both water and energy usage due to the increased heat. Guests are encouraged to ensure that they drink extra water and remain in the shade during the hottest times of the day.
- Due to the increase in utility usage, costs increase at this time, and hotels experience reduced profit margins
- Heat season also coincides with the rainy season and this causes a rise in the number of vector-borne diseases, dengue etc

The biggest challenges are:

- Finance to improve on technology, i.e., A/C and refrigeration, water catchment, etc.
- Increased costs of insurance against damage from cyclones,
- Dependence on agriculture for food, vegetables, meat products, and fisheries which may be also impacted.
- Possible damage to utilities which may result in loss of water and energy supplies
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2.7 ClimSA Project by Ms Sherri Frederick, CIMH

Ms Frederick's pointed out that the project is a four-year project with pilot activities aimed at strengthening the climate services value chains for the health sector in Dominica, the water sector in Jamaica and the Agriculture and food security sector in Guyana. She stated that the provision of climate services at regional and national levels is effectively guaranteed and secured with improvement in terms of access to climatic information. The recent Participatory Integrated Climate Services for Agriculture (PICSA) training held in Jamaica was highlighted. Mention was also made of the upcoming PICSA training in Guyana, as well as training in statistical techniques using the R-INSTAT workshop package.

2.8 PICSA - The Jamaica Experience, by Mr. Adrian Trotman, CIMH

Mr Trotman stated that the PICSA approach was geared towards encouraging farmers to make their own on-farm decisions surrounding climate information, given the knowledge of their farm practices and





experiences with climatic conditions. Farmers use simple tools to think through and put on paper what they typically do on their farms and they may relate and be impacted by the typical conditions as they perceive them. Furthermore, with Then, once provided with a forecast for the upcoming season, the farmer should ask themselves, “does it trigger you, the farmer, to do anything differently?”. Mr. Trotman also pointed out that as a result of the PICSA approach, farmers in other countries, made changes to the crop and other on-farm enterprises, giving Malawi as an example.

2.9 PICSA - The Jamaica Experience, by Mr. Winston Shaw, Senior Director of Rural Agricultural Development Authority (RADA)

Mr Winston Shaw pointed out that the services provided through PICSA are mostly for small farmers and other key stakeholders. The aim is to equip extension officers with knowledge and skills to assist farmers. This involves close collaboration between farmers and extension officers resulting in informed decision making and enhanced adaptation to climate. All of this to ensure sustainable practices as farming is a business. In first training the extension officers in the approach, they themselves then train the farmers, these farmers can then share the information with other farmers, as some farmers will respond better to the information than others. Approximately 150 farmers were trained in the PICSA approach by the trained extension officer. The aim is to have all 100 officers trained so that they can work with more farmers across Jamaica.

2.10 Climate Hazards All Year Round – The Caribbean Reality, by Dr Cedric Van Meerbeeck, CIMH

Dr Cedric Van Meerbeeck began by identifying four key seasons in the Caribbean - the Wet Season, the Dry Season, the Hurricane Season and the Heat Season. The question was then asked as to when we need this critical information. He pointed out that climate hazards occur all year round, with different hazards occurring at different times. Dr. Van Meerbeeck then showed a graphic depicting various hazards such as Sahara dust intrusion, excessive heat, sargassum beaching and coastal flooding, just to name a few, and their typical times of occurrence. He also pointed out that the latest hazard being faced is the fire hazard, now being monitored across the Caribbean. Dr. Van Meerbeeck also suggested that with the production of climate information bulletins we can keep abreast of these events.



Stakeholder meeting- May 25th

3.0 Introduction/ Recap by Mrs Lisa Kirton-Reed, CIMH

The meeting commenced with an official welcome and a recap of the stakeholder meeting held on the previous day. Key points of the various presentations and discussions made by the participants were highlighted and summarised before proceeding with the day's events.



4.0 Presentations

4.1 Developing Climate & Air Quality Services for Health in the Caribbean: Advances, Challenges and Opportunities, by Dr Roché Mahon, CIMH

Dr Roché Mahon began her presentation noting the results of a 2017 PAHO Country Survey on Health and Climate Change which showed that Caribbean health professionals rated many topics where CIMH was actively doing atmospheric monitoring and forecasting and increasingly inter-disciplinary work as “Extremely Important” or as “Important”. This provided a real opportunity for the CIMH to use its suite of climate, dust and air quality early warning information – both monitoring and forecast information - as a basis for providing a more tailored service to the Caribbean health sector. Based on factors like available data and modelling capacity vis-a-vis the importance of addressing certain climate sensitive diseases in the region, CIMH has worked with regional partners at the Caribbean Public Health Agency (CARPHA) and the Pan American Health Organization (PAHO) to determine the main technical thematic areas to be prioritized for joint health-climate work in the Caribbean. These priorities are: a) heat and human health, b) vector borne diseases (particularly dengue) and c) Saharan dust and respiratory health which are being addressed through the multi-year joint health climate workplans enshrined in the Regional Roadmap and Plan of Action for Caribbean Climate Services.

Dr. Mahon gave a brief overview of notable advances in each of these areas, including atmospheric science research on heat characterization and forecasting of heatwaves that has catalysed the ability of Caribbean Met services now being able to offer heat alerts; advances on Saharan dust modeling, as well as the translation and dissemination of model results to the health sector as was the case in 2018 and 2020 when CIMH issued Saharan dust advisories to partners at CARPHA and PAHO, as well as at the national level with Saharan dust and other air quality alerts being made available in the media and through some Met Service websites; and advances in interdisciplinary research for climate informed dengue early warning.

Dr. Mahon talked about the progress made since May 2017 working with regional health partners at CARPHA and PAHO to co-develop and co-deliver the quarterly Caribbean Health Climatic Bulletin (HCB) which represents the Caribbean’s premier integrated climate-health early warning product and has been recognized at the international level by the WMO who is currently developing an in-depth case study on the Bulletin’s development for the 2023 State of Climate Services for Health Report due for release in November 2023.



Dr. Mahon closed by stating the range of current challenges and opportunities for co-developed climate services for health in the Caribbean including: gaps in climate and health data, financial limitations, a lack of expertise in geographic information systems (GIS), statistics, and modelling, a lack of personnel and gaps in local level research. All of this has led to very limited studies at the national level on the relationships between climate and health with very few studies for dengue, air quality, heat.

One key recommendation for the region going forward as recommended by the Lancet Countdown on Health and Climate Change in 2022 is to develop integrated climate and health surveillance systems for climate sensitive diseases.

Dr. Mahon thanked partners that have supported the climate and health portfolio throughout the years including internationally based research partners, CARPHA and PAHO, and national level stakeholders at the national met services and the national ministries of health and expressed optimism about continuing to work with them to advance a common climate services for health agenda.

4.2 Advancing Heat-Health Early Warning in the Caribbean by Wassila Thiaw, National Oceanic and Atmospheric Administration (NOAA)

Dr Wassila Thiaw was unable to attend the meeting in person but made his presentation virtually. He began by mentioning that heat has become a health hazard which has been ignored for too long, also stating that hundreds of people die because of the heat. Mention was also made of a pilot project being undertaken with Senegal, whereby a health early warning system is being developed with heat being the primary focus. Mr. Thiaw stated that health professionals contribute health outcome data that leads to the provision of actionable heat hazard outlooks. He indicated that integrating the health outcome data with heat forecasts provides the basis for early warning bulletins for Senegal. The goal of a similarly proposed project for the Caribbean is to foster collaboration between the World Meteorological Organisation (WMO) and Caribbean partners including the CIMH, the National Meteorological and Hydrological Services (NMHSs), Ministries of Health, the Caribbean Public Health Agency (CARPHA), along with other global players such as Pan American Health Organisation (PAHO), the Red Cross and Universities result in the development of heat wave forecasting tools for the Caribbean.

4.3 Identifying Heat Events across the Caribbean: patterns and causes by Dr Theodore Allen, CIMH

Dr Theodore Allen asked the question “How do we identify a heatwave?”. He showed the distinction between four different definitions of heat wave classifications. Heat waves can be described either by 1) extreme heat days with a minimum consecutive duration of 2 days, 2) warm spell days with a minimum consecutive duration of 7 days, 3) hot days with a minimum duration of 2 days or 4) hot and humid days with a minimum consecutive duration of 2 days. He also contrasted differences in heat wave calculations with an absolute temperature definition or a percentile based definition.





Dr. Allen then went on to show inter-annual variability in annual heat wave statistics, pointing out that the number of hot days across the region varies every year. He spoke about the climatology of the Universal Thermal Climate Index and episodes when there is a low diurnal range period for temperatures. Dr Allen also mentioned that tropical storms can transport high humidity into a region, whereby we can get lagged heat impacts post storm.

4.4 Climate services for health: co-developing a dengue early warning system in Barbados, by Rachel Lowe, London School of Tropical Medicine and Hygiene

It was highlighted by Dr. Rachel Lowe, that the focus of recent past work in Barbados is that of earth sciences and Global health resilience, where the information available from global products is used and converted into useful information on the ground. In terms of dengue, Ms. Lowe spoke about conducting modelling studies to understand climatic drivers for dengue outbreaks. Such a project began in 2017 under the USAID funded BRCCC programme involving CIMH and CARPHA and piloted in Barbados and Dominica. She reported that further work was being conducted with the Ministry of Health and Wellness in Barbados along with the CIMH and CARPHA that builds on the initial study. A comparison was done between a climate driven model and a baseline model, and it was shown that the climate model performed better. The climate driven model utilises six month Standard Precipitation Index (SPI6) with a 3 month lead, rainfall and temperature. The research team also assessed the influence of dry conditions followed by wet conditions as a trigger for dengue outbreaks.

Dr. Lowe concluded by stating that there is a need to be able to translate probabilistic models into action. Ms. Lowe indicated that there is another project which looks at harmonizing multi-scale spatiotemporal data for climate driven health outcomes.

4.5 Health Impacts of Saharan Dust in the Caribbean, by Dr Andrea Sealy, CIMH

Dr Andrea Sealy pointed out that Sahara dust affects air quality and human health and currently research is being conducted at Ragged Point in St Phillip, Barbados. Reference was then made to the historic “Godzilla” dust event which occurred in June 2020, noting the high Particulate Matter (PM) concentration during that time. During the event, the visibility was very low as it dropped from 30 km to 6 km. This affected the fishing industry, especially those without GPS would have encountered navigation issues. In general, transport is dangerous during these times especially for marine operations and aviation.

Mention was also made of studies that showed water quality being compromised. In the event that rainwater is untreated, there is the risk of contamination from dust, bearing in mind that water contamination can occur in storage tanks. Also being investigated are bacteria and other pathogens which can cause respiratory illnesses.

Dr Sealy also mentioned the Caribbean Aerosol Health Network (CAHN) which was established to improve our understanding of the relationships between climate, weather, ecosystems and air quality. With air quality forecasting being a necessity, the CIMH provides dust and air quality 7 day forecasts twice daily for the Caribbean.





4.6 Co-developing climate Early Warning Information for Health at Regional and National levels, by Jodi-Ann Petrie, CIMH

Ms. Jodi-Ann Petrie spoke about the Caribbean Health Climatic Bulletin, a tool which is co-developed by CIMH, CARPHA and PAHO. Ms. Petrie’s presentation focused on the Caribbean recent HCB upgrade process which produced an upgraded Caribbean HCB template as well as a new national level health-climate bulletin template. The upgrade exercise entailed the convening of three focus group testing exercises, with the first exercise being face to face in Jamaica on September 13th 2022, followed by two other virtual exercises on November 7th and 28th 2022. The revamped HCB Newsletter was completed in March 2023. It was stated that dissemination methods are being discussed with the partnering institutions. A case study from Dominica - the pilot country for health under the ClimSA Programme - was then highlighted when Dominica’s climate and health stakeholders were invited give their perspectives on how they can possibly use the new national level health-climate bulletin template as a basis for working together in the future. The Met Service perspective was provided by Ms. Vernie Honore who stated that the Dominica Met Service is willing to work with the Ministry of Health to co-develop tailored products. Dominica’s Focal Point for Climate Change and Health, Mr. Sylvester St. Ville, mentioned that Climate and Health newsletters are issued every three months and forecasts provided with implications. It was stated that the information provided in the newsletters comes from the Caribbean RCC bulletins and this information is modified for Dominica. However, closer ties with the met office desirable going forward.

4.7 Capacity building in Climate and Health: Experiences from the Caribbean Climate Change and Health Fellows, by PAHO/UWI Climate Change and Health Fellows

Health professionals from the first and second cohorts of the Fellows of the EU-funded Strengthening Climate Resilient Health Systems in the Caribbean project participated in a panel discussion of capacity building challenges for climate and health in the Caribbean. Dr Kim Newton-James (Environmental Toxicologist, Saint Lucia), Mr. Steve Daniel (Environmental Health Specialist Ministry, Barbados), Dr. Nicole Dawkins-Wright (Medical Doctor and Public Health Practitioner, Jamaica) and Ms. Linnees Green-Baker (Environmental Health Specialist, Jamaica) shared thoughts on their experiences and objectives as it relates to health and climate under the PAHO/UWI-led Fellowship Training programme, as well as their recommendations for future capacity building in this area for the region.

4.8 Hydrometeorological Services for the Water Sector - Sponsored by the Intra-ACP GCCA+ Programme in the Caribbean: Enhancing Climate Resilience in Cariforum Countries, executed by the Caribbean Community Climate Change Centre

4.8.1 Caribbean Dewetra Platform: Impacts-based forecasting and Early Warning for the Water Sector, By Shawn Boyce (CIMH)





Mr. Shawn Boyce defined an early warning system as an integrated system of hazard monitoring and forecasting. He then went on to describe the platform he will showcase - the Caribbean Dewetra Platform. Mr. Boyce reported that Dewetra was developed in Italy by the CIMH Research Foundation where it is used by civil protection agencies. He added that an instance of the platform was developed and installed at the CIMH under a UNDP-led initiative in 2011 and that the platform continues to be sustained by the CIMH where it is used to support impact-based forecasting and near real-time monitoring within the Caribbean. It was pointed out that the platform is a good tool with “real time” information continuously being published to support risk-based decision-making. This included near real-time water quality observations (e.g., turbidity, conductivity) from stations installed in the Caribbean and flood forecasting tools for targeted watersheds.

Analysis is also done through the interrogation of spatial data sets which provide estimations of rainfall amounts observed/expected across various watersheds and support early warning and forecasting workflows. The outputs can be manipulated to show accumulations over different time windows as well as overlay over watersheds and assets to determine exposure, identify at risk elements and quantify expected impacts. The platform supports the identification, analysis, evaluation and qualitative assessment of risks from multiple hazards forming the basis for a Multi-Hazard Early Warning System (MHEWS). The integration of water utility assets would support risk-based decision making within the water sector resulting from the onset of adverse weather. Mr. Boyce indicated that he will be contacting water resource managers regarding the integration of water utility related assets.

4.8.2 Seasonal and sub-seasonal prediction of rainfall extremes, by Simon Mason, IRI and Cedric Van Meerbeeck, CIMH

Dr Van Meerbeeck asked the question “Why Climate Services?” then spoke about climate risks, as well as adaptation to these risks. He mentioned the importance of timescales of climate information when it comes to planning and early warning, which entails looking at decades to years ahead, providing alerts before and throughout the season, as well as updated alerts on a daily basis. He went further to say that climate information services can, therefore, span from long term planning and adaptation to a period of preparedness, then finally alerting and response, all of which requires adequate climate monitoring and prediction.

Dr. Van Meerbeeck indicated that forecasts alone would not necessarily indicate the true potential impact from hydroclimatic hazards, suggesting that it is possible to have the same forecast, but with different impacts. For example, the likelihood of drought in the upcoming months could have different outcomes if the previous months were wet or dry. Dr. Meerbeeck also pointed out that it is not easy to predict exactly when during the upcoming few months a hazard will occur, so that is why it is important to monitor the climate throughout the season as long as the data is available in a timely manner.





In preparing outlooks on flash flood potential outlook and extremes certain definitions had to be agreed upon by the meteorologists and climatologists from across the region. Dr. Van Meerbeeck provided the following definitions used by CariCOF meteorologists and climatologists – 1. a wet spell is defined as the 80th percentile of the 7- day rolling period, 2. very wet spells, the 90th percentile of the 7 -day rolling period and 3. extreme wet spells, as the 99th percentile of the 3- day rolling period. On the other end of the rainfall spectrum, dryness can be described by dry spells 7 and 15 days, and drought as defined using the Standardised Precipitation Index (SPI) of length 6 and 12 months.

Dr Mason engaged participants in a “spot the ball” game type segment where video clips of a football match were shown and based on the positioning and antics of the players on the field at the specified time, one had to determine the exact position of the ball at each stage. This can be viewed as the procedures that one would go about when trying to make a forecast of an outcome based on the information provided.

In terms of sub seasonal predictability and predictions the initial focus is on the wet season onset, a timescale commonly referred to as the sub seasonal to seasonal (S2S) timescale. One of the influences on sub-seasonal to seasonal rainfall prediction is the Madden Julian Oscillation (MJO). It was noted that the MJO typically moves from west to east with a cycle of about one to two months carrying a large layer of strong convection, with each phase lasting 5 to 7 days. This takes place between the central Pacific east of the dateline and Africa. Dr Mason also displayed the Wheeler- Hendon Diagrams, for the prediction of the MJO, which is the main forecasting tool spanning from phase 1 to phase 8, with each phase lasting 5 to 7 days. He then went on to mention the Real Time Multivariate MJO Index (RMMI) based on zonal winds at 800 and 250 mb, and outgoing longwave radiation (OLR).

Dr. Mason concluded by mentioning the S2S prediction project with coordinated research activity being conducted between the World Weather Research Programme (WWRP) and the World Climate Research Programme (WCRP).

4.9 Meeting Summary, by Mr. Adrian Trotman, CIMH

Mr. Adrian Trotman brought the meeting to a close as he highlighted the goals achieved based on the activities which took place and focused on making plans for the way forward.





Appendix I: Forum Agenda

The Caribbean Climate Outlook Forum (CariCOF)

2023 Wet/Hurricane Season

Kingston, Jamaica May 24th – 25th, 2023

AGENDA

Wednesday, 24th May, 2023

TIME	SESSION	PRESENTER/FACILITATOR
0900 - 0930	Welcome remarks Feature address	Adrian Trotman , CIMH Jacqueline Spence , Meteorological Services, Jamaica (MSJ) European Delegation, Jamaica (TBC) Minister Ministry Economic Growth and Job Creation (TBC)
0930 - 0950	Wet/Hurricane Season Climatology of the Caribbean & Review of the 2022 Wet Season and recent conditions in the Caribbean	Shontelle Stoute , CIMH
0950 - 1020	El Nino Update Wet/Hurricane Season Climate Outlook (rainfall, temperature, wet days/wet spells, drought, dry spells, heatwaves, coral bleaching outlook, flash flood potential)	Theodore Allen (CIMH) & MSJ
1020 - 1030	Open discussion on the Seasonal Forecast	MSJ & Cedric Van Meerbeek (CIMH)
1030 - 1100	COFFEE BREAK	
1100 - 1130	An outlook on the 2023 Hurricane Season	Cedric Van Meerbeek , CIMH,
1130 - 1210	Preparing Caribbean Sectors for future Climate-related Challenges	Jayaka Campbell (CSGM)
1210 - 1225	Q&A on future Climate Challenges	All
1225 - 1330	LUNCH	





1330 - 1415	Thinking through the implications of the seasonal forecasts and future Caribbean Climates on Sector productivity	Breakout Groups
1415 - 1445	Group Reports to Plenary and Discussion	
1445 - 1500	COFFEE BREAK	
1500 - 1530	PICSA - The Jamaica Experience	RADA & Adrian Trotman (CIMH)
1530 - 1550	Climate Hazards All Year Round – the Caribbean reality	Cedric Van Meerbeek (CIMH)
1550 - 1600	Close of Day 1	Adrian Trotman (CIMH)

Thursday, 25th May, 2023

TIME	SESSION	PRESENTER/FACILITATOR
0900 – 0910	Welcome & Recap of Day 1	Lisa Kirton-Reed (CIMH)
0910 – 0925	Climate and health overview presentation	Roché Mahon (CIMH)
0925 – 0940	Heat and health	Theodore Allen (CIMH)
0940 – 0955	PREPARE Project	Wassila Thiaw (NOAA)
0955 – 1010	Dengue early warning	Rachel Lowe ()
1010 – 1025	Open Discussion	All
10:25 – 10:45	COFFEE BREAK	
10:45 – 11:00	Saharan dust and health	Dr. Andrea Sealy, CIMH
11:00 – 11:20	Co-developing climate early warning information for health at regional and national levels	Dr. Roché Mahon/Jodi-Ann Petrie CIMH

11:20 – 11:45	Capacity building in Climate and Health: Experiences from the Caribbean Climate Change and Health Fellows	PAHO/UWI Climate and Health Fellows
11:40 – 12:00	Open Discussion	All
1215 - 1315	LUNCH	
1315 - 1430	Caribbean Dewetra Platform: Impacts-based forecasting and Early Warning for the Water Sector	Shawn Boyce (CIMH)
1430 - 1445	Coffee Break	
1445 - 1600	Seasonal and sub-seasonal prediction of rainfall extremes	Simon Mason & Cedric Van Meerbeek
1600 - 1610	Summary of meeting achievements and next steps	Adrian Trotman





Appendix II: Attendee List

Organisation	Last Name	First Name	Email contact
Antigua	Paige	Orvin	odepaige@yahoo.com
Aruba	Irausquin	Lothar	lothar.irusquin@meteo.aw
Bahamas	Tynes	Trinard	TRINARDTYNES@BAHAMAS.GOV.BS
Barbados	Whitehall	Shanice	Shanice.Whitehall@barbados.gov.bb
Belize	Young	Shanea	syoung@nms.gov.bz
Cayman Islands	Forbes	Kerrie	Kerrie.Forbes@gov.ky
Cayman Islands	Gall	Winston	Winston.Gall@gov.ky
Cuba	Hernandez	Anabel	anabel.garcia@insmet.cu
Curacao	Constancia	Endy	endy.constancia@meteo.cw
Dominica	Honore	Vernie	vmhonore@gmail.com
Dominican Rep	Matos	Miriam	mimat19@hotmail.com
Grenada	Johnson	Kassia	kjohnson@gaa.gd
Guyana	Dhiram	Komalchand	kdhiram2015@gmail.com
Guyana	Samaroo	Kelvin	kelvin3050@yahoo.com
Jamaica	Fearon	Peter	p.fearon@metSERVICE.gov.jm
Jamaica	Hibbert	Nikiesha	n.hibbert@metSERVICE.gov.jm
Jamaica	Shaw	Adrian	adrian.shaw@mhurecc.gov.jm
Jamaica	Moody	Ronald	r.moody@metSERVICE.gov.jm
Jamaica	Spence	Jacqueline	j.spence@metSERVICE.gov.jm
Martinique	Legoutte	Philippe	philippe.legoutte@meteo.fr
Puerto Rico			
St. Kitts	Benjamin	Vincere	vincere.benjamin@scaspa.com
St. Lucia	Saltibus	Vigil	mistyeee@hotmail.com
St. Vincent	Cato	Gregory	gregorycato@gmail.com
Suriname	Nanda	Radjkoemar	nradj211263@gmail.com
Trinidad	Kissoon	Kaidar	kaidarkissoon@gmail.com





Organisation	Last Name	First Name	Email contact
Trainer	Mason	Simon	simon@iri.columbia.edu
CIMH	Trotman	Adrian	
CIMH	Van Meerbeeck	Cedric	
CIMH	Allen	Teddy	
CIMH	Stoute	Shontelle	
CIMH	Kirton-Reed	Lisa	
CIMH	Applewhaite	Andrea	
CIMH	Mahon	Roche	
CIMH	Deane	Lyn-Marie	
CIMH	Boyce	Shawn	
CIMH	Petrie	Jodi-Ann	
CARDI	Lucas	Paul	plucas@cardi.org
CARPHA	Kirton	Shane	kirtonsh@carpha.org
CCCCC	Jones	Albert	ajones@caribbeanclimate.bz
CHTA	Duffy-Mayers	Loreto	loretoduffy@gmail.com
CMO	Anderson	Haley	handerson@cmo.org.tt
CWWA	Santana	Candice	candicesantana24@gmail.com
OECS	Isaac	Cornelius	cornelius.isaac@oecs.int
CCREEE	Whyte	Felicia	felicia@ccreee.org
CTO	Charles	Amanda	acharles@caribtourism.com
CDEMA	Greenidge	Nicole	nicole.greenidge@cdema.org
GWP-C	Lewis	Simone	simone.lewis@gwp-caribbean.org
TCI	Henfield	Tiffany	tiffanyhenfield@tciairports.tc
Ant Water	Yearwood	Veronica	veronica@apua.ag
Bdos	Waterman	Jalisa	Jalisa.Waterman@bwa.gov.bb
Tdad	Karim	Roger	Roger.Karim@wasa.gov.tt
Ant Health	Edwards	Tajah	Tajah.Ed@hotmail.com
Dom	St. Ville	Sylvester	sylst50@gmail.com
Ant Disaster	Ward	Myron	Myron.Ward@ab.gov.ag
Bdos	Johnson	Joy-Anne	Joy-Anne.Johnson@barbados.gov.bb





Organisation	Last Name	First Name	Email contact
TCI	DeBellott	Kevern	kadellott@gov.tc
PAHO Health	Daniel	Steve	Steve.Daniel@health.gov.bb
CMC	Chance	Kenton	kentonxtchance@gmail.com
PAHO Health	Newton	Kim	newtonmk@gmail.com
CWSA	Ballantyne	Danroy	dballantyne@cwsasvg.com
WRA	Chambers	Kevin	kchambers@wra.gov.jm
Nat'l Water Comm	Oliphant	Jason	jason.oliphant@nwc.com.jm
RADA	Shaw	Winston	winston.shaw@rada.gov.jm
UWI Mona	Mandal	Arpita	arpita.mandal@uwimona.edu.jm
UWI Cavehill	Gouirand	Isabelle	isabelle.gouirand@cavehill.uwi.edu
PAHO	Green-Baker	Linnese	linnesebaker@yahoo.com
PAHO	Wedderburn-Harris	Tashia	Tashia.Wedderburn-Harris@moh.gov.jm
ODPEM	Richardson	Antoniell	akirkland.odpem@gmail.com
Climate Change	Alleyne	Ajani	Ajani.Alleyne@megjc.gov.jm

